

# Integrating P2 Into the Permit and Enforcement Processes

## Painting and Coatings Industry

The painting and coatings industry uses chemical compounds to protect workpiece surfaces or distinguish them from other products or workpieces. The painting and coating process can be broken down into three major categories: cleaning and surface preparation, application of coatings, and equipment cleaning. Air pollution is a major issue for this industry and multimedia wastes generated by this sector include VOC and HAP emissions, paint-related hazardous wastes, and water discharges from metal cleaning or pretreating. Due to the fact that many wastes are generated by this sector there are also many waste reduction P2 opportunities. These opportunities include the following:

- Surface preparation and pretreatment alternatives
- Coating alternatives such as powder, high solids, and water-based
- High-efficiency coating application equipment
- Equipment cleaning minimization and alternatives

**Alternative surface preparation:** Surface preparation may require the use of conversion coatings such as phosphatizers to promote better coating adhesion to the surface of the object. Wastewater from this process must be treated on-site or permitted for discharge to the POTW or surface water. Substitution of an aqueous cleaner for a solvent cleaning system will eliminate VOC and HAP emissions. Aqueous ultrasonic cleaning units are very efficient for cleaning parts that have small crevices. Several aqueous ultrasonic cleaners are available and range in cost from \$3000 to \$16,000.

Moving to a closed-loop system is sometimes necessary for shops in rural areas. Some units utilize an evaporation system for nonhazardous solutions to prevent the need to discharge to a POTW. Initial costs of these units may be high; however, testing has shown that evaporators could be used at a cost of 33 cents per gallon energy costs using an evaporator with an 80-gallon reservoir which can be purchased for \$5,000. It may not be cost-effective to use evaporators for large quantities of wastewater. Automated five-stage washers can be used for cleaning and pretreatment purposes in place of wand phosphatizing. These systems require large capital investments but allow the maximum use of chemicals and water to effectively clean and prepare surfaces for coating application.

**Permitting:** The use of an aqueous system to replace a solvent system will result in reduced VOC emissions. Closed-loop systems or systems that utilize approved evaporation can minimize or eliminate wastewater discharges. These P2 options may decrease or eliminate regulatory permitting needs.

**SEP:** These alternative systems may have an obvious benefit, especially for a multimedia enforcement need or program.

**Coating alternatives:** Powder coatings eliminate solvent in the coating and greatly reduce the amount of solvent needed for cleaning. They do not require mixing or

stirring and have a very high transfer efficiency rate. Most powder coating systems are designed to collect overspray for immediate reuse, resulting in up to 100% product use. Hazardous solvents and air emissions are virtually eliminated with this material change. Powder coatings provide a very durable coating and are often used for decorative fences and lawn furniture. One company replaced its liquid paint system with a powder coating system and reduced their hazardous waste generation from 38,350 pounds per year to 4,800 pounds per year. Air emissions were significantly reduced as well. In this case, capital costs for the system were \$20,000 and offered a payback within 14 months.

**Permitting:** This technology can offer obvious permitting avoidance opportunities for air and significant reductions in the generation of hazardous waste.

**SEP:** This is an excellent pollution prevention enforcement project for purposes of reducing hazardous wastes and air emissions, as well as the associated regulatory burden and liabilities.

**High-efficiency coating application equipment:** The type of coating used at a facility often dictates the spray equipment used. For businesses that use a solvent-based coating and still use conventional spray equipment, an upgrade of the equipment should result in reduced emissions and hazardous wastes, as well as raw product.

**HVLP:** Traditionally air-atomized guns have been used to apply solvent-based coating and have transfer efficiency as low as 30%. That means that of every ten gallons applied to the workpiece, only three gallons actually go on the workpiece, and seven gallons are lost to emissions or waste. HVLP technology can increase transfer efficiency from 65 to 90%, reducing overspray, VOC, and HAP emissions while providing good coverage for intricate parts. HVLP guns only cost about \$350 and are widely available. The equipment is only as good as the operator. It is very important that operators are properly trained so that ultimate transfer efficiencies can be achieved. Training is available through vocational schools and specialized P2 painting programs operated by the Iowa Waste Reduction Center.

**Mix-at-gun:** Mix-at-the-gun systems reduce raw material loss and solvent use because the paint is mixed as it is used, over-mixing and line-cleaning waste is greatly reduced. One cost-benefit analysis for this project indicated a great savings in reduced raw product with a first year total savings of \$34,150. In this example, the equipment cost was \$8500 with a payback in three months.

**Dedicated delivery systems:** With this type of system, coatings are purchased in large quantities, and a dedicated delivery line is connected to the drum with a specialized cover. This system reduces the need for cleanup of delivery lines between color changes and reduces the potential for spills. The system includes an agitator to keep contents mixed and a heater to control viscosity for a smoother delivery. The entire system costs about \$5000 and quickly pays for itself.

**Permitting:** Provide information about these systems, and their raw material savings and potential for emission reductions during the permit process.

**SEP:** Equipment upgrades should be considered as a portion of an enforcement program, especially if the operations must continue with a solvent-type coating. Specialized training outreach is another SEP option.